IN THE CLAIMS - AMENDED VERSION

1) A nozzle heater-cooler assembly, comprising:

a) a hollow cylindrically shaped cartridge that contains an electrical element that contacts flat against the bottom surface of a housing;

b) a spring biasing said cylindrically shaped cartridge to lower as measured from base of said nozzle hub to enable a change in position of said electrical element;

c) a second larger diameter cylindrically shaped body that said cylindrically shaped cartridge and said spring are fit surrounds the cartridge and spring;

d) a central opening means for allowing said heater cooler assembly to slide on body of said nozzle and moveable from an unlocked position with main slide retracted from said nozzle with a groove to a locked position with said main slide extending into said nozzle with a groove;

e) an electrical path through metallic rods and springs to enable conductors to fit in a small space and allow movement by translation of the electrical path along one axis a series of dissimilar metal rods with a common heat conduction pad that enables electrical connection of all said dissimilar metal rods;

f) a convective cooler design for said nozzle that simultaneously directs pressurized gas along each face of a hexagonally shaped hub;

g) a resistive element design composed of two elements on parallel planes, electrically connected in a series circuit.

2) The nozzle heater-cooler assembly of Claim 1, wherein a change in position of said electrical element divided into the perimeter of the heated space exceeds one.

3) The nozzle heater-cooler assembly of Claim 1, wherein said second larger diameter cylindrically shaped body that said cartridge and said spring are fit is about 50mm in diameter and 25 to 40 mm in height.

4) The nozzle heater-cooler assembly of Claim 1, wherein said hollow cylindrically shaped cartridge that contains said electrical element that contacts flat against the bottom surface of said housing is between 8 mm to 20 mm in diameter.

5) The nozzle heater-cooler assembly of Claim 1, wherein said resistive element design composed of two elements on parallel planes, electrically connected in a series circuit are helix shaped windings of high resistance metallic conductor with a resistance somewhere between 50 and 250 ohms.

6) The nozzle heater-cooler assembly of Claim 1, wherein said central opening means for allowing said heater-cooler assembly to slide on body of said nozzle and moveable from an unlocked position with main slide retracted from said nozzle with a groove to a locked position with said main slide extending into grove on said nozzle is a flat guillotine mounted slide perpendicular to the axis of the cylindrical body occupying a slot through the part preventing egress of said cylindrically shaped cartridge and said spring that biases said cylindrically shaped cartridge with a groove.

7) The nozzle heater-cooler assembly of Claim 1, wherein said central opening means for allowing said heater-cooler assembly to slide on body of said nozzle and moveable from an unlocked position with main slide retracted from said nozzle with a groove to a locked position with said main slide extending into said groove on said nozzle hub is locked by an outwardly extended retaining member.

8) The nozzle heater-cooler assembly of Claim 1, wherein said hollow cylindrically shaped cartridge that contains said electrical element that contacts flat against the bottom surface of a thermally conductive, electrically insulating housing resting on an interior lip extending around the inside perimeter of said cylindrically shaped cartridge, conducts heat into the enclosed space containing and surrounding said nozzle.

9) The nozzle heater-cooler assembly of Claim 1, wherein said second larger diameter cylindrically shaped body that said cylindrically shaped cartridge and said spring are fit utilizes o-rings to seal the interface between said cylindrically shaped cartridge and said larger diameter cylindrically shaped body.

10) The nozzle heater-cooler assembly of Claim 1, wherein said resistive element design composed of two elements on parallel planes, electrically connected in series are out of phase 180° in comparison of a lower element winding start to a upper element winding start around a concentric cylinder.

11) The nozzle heater-cooler assembly of Claim 1, wherein said series of dissimilar metal rods that contact a common heat conduction pad which enables electrical connection of all the dissimilar rods to form a series circuit pair wise, any two said dissimilar metal rods will produce discrete thermocouple types.

12) The nozzle heater-cooler assembly of Claim 1, wherein said, convective cooler design for a nozzle that simultaneously directs pressurized gas along each face of said hexagonal shaped hub uses a diffuser to direct and distribute cooling gas to each face of the hexagonally shaped nozzle base.

13) The nozzle heater-cooler assembly of Claim 1, wherein said central opening means for allowing said heater-cooler assembly to slide on body of said nozzle and moveable from an unlocked position with said main slide retracted from said nozzle with a groove to a locked position with said main slide extending into said nozzle with a groove and has an integral abutment and said lower body includes an abutment that are coincident when lock is in the normally closed position and are closely spaced when locked to said nozzle body.

14) The nozzle heater-cooler assembly of Claim 1, wherein said central opening is sealed around the nozzle body outside diameter using a seal clamped to the heater-cooler upper body.

15) The nozzle heater-cooler assembly of Claim 1, wherein said electrical path through said metallic rods and said springs permits conductors to fit in a small space and allow movement by translation of said electrical path along one axis, pins from the integral connector also function as the cantilever springs that are in intimate contact with the rods in each groove to enable construction of sliding discrete electrical connections.

16) The nozzle heater-cooler assembly of Claim 1, wherein said resistive element design composed of two elements on parallel planes, about 0.1 mm to2 mm but more preferably 0.1mm to 1mm apart.

17) The nozzle heater-cooler assembly of Claim 1, wherein said central opening means for allowing said heater-cooler to slide on body of said nozzle hub and moveable from an unlocked position with said main slide retracted from said nozzle hub groove to a locked position with said main slide extending into groove on said nozzle hub with enough force to resist any strong movement but allow rotation so as not to exert torque on said nozzle hub.

18) A nozzle hub for connection and support of a nozzle heater-cooler has a groove that extends concentrically around the hub body circumference, which can be continuous or intermittent in 360° of rotation at a distance that exceeds the depth of an element housing installed in a spring biased cartridge.

19) A nozzle heater-cooler apparatus, comprising:

a. an input port for cooling gas flow into the heater-cooler apparatus;

b. an integral electrical connector molded into the lower body of the apparatus for electrical input and temperature data output;

c. connection logistics for the heater-cooler apparatus require a large diameter cylindrically shaped body to integrate triangular protrusions opposite a main slide.

20) The nozzle heater-cooler apparatus of Claim 19, connection logistics require said large diameter cylindrically shaped body to integrate said triangular protrusions opposite said main slide, the triangular protrusions provide structure to form generous radii across, large enough to fit index finger and forefinger to enable use of thumb for actuation of said main slide.